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L5: Entry 6 of 7

File: USPT

Jul 30, 1996

DOCUMENT-IDENTIFIER: US 5540981 A
TITLE: Inorganic-containing composites

INVENTOR (1):
Gallagher; Michael K.

Brief Summary Text (12):

(a) forming one or more metal-loaded polymers by loading one or more soluble metal compounds into each of one or more polymers wherein each of the one or more polymers has a particle size in the range of from 10 nanometers to 15,000 nanometers to form one or more metal-loaded polymers;

Brief Summary Text (16):

(a) forming a first set of one or more polymers by loading one or more soluble metal compounds into each of one or more polymers wherein each of the polymers has a particle size in the range of from 10 nanometers to 15,000 nanometers to form a first set of one or more metal-loaded polymers;

Brief Summary Text (17):

(b) forming a second set of one or more metal-loaded polymers by loading one or more soluble metal compounds into each of one or more polymers wherein each of the polymers has a particle size in the range of from 10 nanometers to 15,000 nanometers to form a second set of one or more metal-loaded polymers;

Brief Summary Text (29):

A suitable process for preparing polymers having a particle size in the range of from 10 nanometers to 15,000 nanometers is, for example, by an emulsion polymerization processes. Polymers prepared by emulsion polymerization processes are referred to hereafter and in the appended claims as "emulsion polymers." Emulsion polymerization processes are well known to those of ordinary skill in that art. For example, U.S. Pat. No. 4,359,537 to Chong (hereafter "Chong"), the disclosure of which is hereby incorporated by reference, teaches an emulsion polymerization process for producing emulsion polymers useful in the present invention. The emulsion polymers taught by Chong are functionalized polymers prepared by emulsion polymerization processes having particle sizes in the size range which is useful for the present invention.

Brief Summary Text (30):

Other suitable processes for preparing polymers having a particle size in the range of from 50 nanometers to 15,000 nanometers include, for example, grinding or pulverizing ion-exchange resins prepared by suspension polymerization processes, and grinding or pulverizing polymers prepared by bulk polymerization. Polymers prepared by suspension polymerization processes are referred to hereafter and in the appended claims as "suspension polymers." Suspension polymerization processes are well-known to those skilled in the art, and include, for example, processes for making gellular resins and macroreticular resins such as those taught in U.S. Pat. Nos. 4,382,124, 4,486,313, 4,501,826 and 4,224,415 to Meitzner, et al., herein incorporated by reference.

Detailed Description Text (2):

The following is a general procedure suitable for preparing a styrene divinylbenzene emulsion polymer having a particle size in the range of from 10 to 15,000

nanometers. A monomer emulsion is prepared by stirring vigorously under a nitrogen atmosphere 370 g of deoxygenated water, 48.2 g of the sodium salt of an alkyl aryl polyether sulfonate surface-active agent containing 28% solids, 348.8 g of styrene and 51.2 g of commercial-grade divinylbenzene (54.7% divinylbenzene, balance essentially ethylvinylbenzene). An aqueous initiator solution is prepared by dissolving 2.0 g of potassium persulfate in 100 g of deoxygenated water, and 50 g of the monomer solution is added to the initiator solution. The mixture is stirred to develop a 1-inch vortex and is heated to 70.degree. C. under the nitrogen atmosphere. When polymerization begins, as evidenced by a sudden decrease in opacity, the remaining monomer emulsion is added over a period of 1.5 hours. The temperature is held at 70.degree. C. for one hour after the addition is completed. The polymer emulsion is cooled to room temperature and filtered through cheesecloth. If desired, the emulsion polymer prepared above can, for example, be sulfonated to produce a strong acid resin, or it can be chloromethylated and quarternized with, for example, methyl chloride or methyl iodide to form a strong base emulsion polymer.

CLAIMS:

1. A method for making a composite, comprising:

(a) forming one or more metal-loaded polymers by loading one or more soluble metal compounds into each of one or more polymers wherein each of the one or more polymers has a particle size in the range of from 10 nanometers to 15,000 nanometers to form one or more metal-loaded polymers;

(b) contacting a support material with each of the one or more metal-loaded polymers; and

(c) removing the one or more polymers to form a composite.

2. A method for making a composite, comprising:

(a) forming a first set of one or more polymers by loading one or more soluble metal compounds into each of one or more polymers wherein each of the polymers has a particle size in the range of from 10 nanometers to 15,000 nanometers to form a first set of one or more metal-loaded polymers;

(b) forming a second set of one or more metal-loaded polymers by loading one or more soluble metal compounds into each of one or more polymers wherein each of the polymers has a particle size in the range of from 10 nanometers to 15,000 nanometers to form a second set of one or more metal-loaded polymers;

(c) contacting a support material with the first set of one or more metal-loaded polymers;

(d) removing the polymer to form a composite;

(e) contacting the second set of one or more metal-loaded polymers with the composite of (d) above; and

(f) removing the polymer to form a composite.

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L6: Entry 8 of 26

File: USPT

Oct 9, 2001

DOCUMENT-IDENTIFIER: US 6300407 B1

TITLE: Polymeric (meth)acrylate plasticizers and processing aids for elastomers

INVENTOR (2):Gore; Robert HowardBrief Summary Text (22):

Generally, any suitable elastomer may be used in the elastomer compositions of the present invention. Preferably, the elastomer is a thermosetting, crosslinking elastomer. Suitable elastomers include, but are not limited to, natural rubbers; modified natural rubbers including those grafted with acrylates or those which are halogenated; styrene-butadiene elastomers such as styrene-butadiene rubber (SBR), solution SBR (SSBR), carboxylated SBR (XSBR), high styrene-butadiene copolymer (HS/B), pyridine(vinyl)-styrene-butadiene rubber (PSBR); chloroprene elastomers such as poly-chloroprene elastomers (CR) and carboxylated polychloroprene rubber (XCR); polybutadiene elastomers including 1-2 isomers, hydroxyl, carboxyl, emulsion polybutadiene rubber (EBR), and halogen terminated polybutadiene elastomers; butyl elastomers such as polyisoprene elastomers (IR), isoprene/isobutylene elastomers (IIR), halogenated butyl rubber (HIIR) such as bromobutyl elastomer, chlorobutyl elastomer, and polyisobutylene elastomers; nitrile elastomers such as acrylonitrile-butadiene elastomers (NBR), carboxylated NBR (XNBR), hydrogenated and partially hydrogenated acrylonitrile-butadiene elastomer (HNBR), nitrile-isoprene elastomers (NIR); polyethylene elastomers such as chlorinated polyethylene elastomer and chlorosulfonated-ethylene elastomer; ethylene-propylene elastomers such as co-polymers (EPM) and terpolymers (EPDM) of ethylene and propylene; acrylic based elastomers such as acrylate elastomers (AM), acrylate butadiene elastomer (ABR), and ethylene-acrylic elastomers; silicone elastomers such as organopolysiloxane elastomers; fluoroelastomers; epichlorohydrin elastomer; polyalkenamer elastomers such as elastomers prepared, for instance, from cyclooctene, cyclopentene, or 1,5-cyclooctadiene monomers; organic polysulfide elastomers; urethane elastomers; and mixtures or blends thereof. In one embodiment, the at least one elastomer is a styrene-butadiene elastomer, chloroprene elastomer, butyl elastomer, polybutadiene elastomer, nitrile elastomer, polyethylene elastomer, ethylene-propylene elastomer, acrylic elastomer, silicone elastomer, fluoroelastomer, epichlorohydrin elastomer, polyalkenamer elastomer, polysulfide elastomer, urethane elastomer, mixtures thereof or blends thereof. In a preferred embodiment, the at least one elastomer is an acrylonitrile-butadiene elastomer, hydrogenated acrylonitrile-butadiene elastomer, partially hydrogenated acrylonitrile-butadiene elastomer, modified polyethylene elastomers such as chlorinated or chlorosulfonated polyethylene elastomer, ethylene-acrylic elastomer, styrene-butadiene elastomer, fluoroelastomer, or mixtures or blends thereof. In a more preferred embodiment, the at least one elastomer is acrylonitrile-butadiene elastomer, hydrogenated acrylonitrile-butadiene elastomer, partially hydrogenated acrylonitrile-butadiene elastomer, fluoroelastomer, mixtures thereof or blends thereof. In a most preferred embodiment, the at least one elastomer is a fluoroelastomer.

Brief Summary Text (44):

The elastomer compositions of the present invention may also include a crosslinking accelerator to be used in combination with the curing agent. The accelerator provides shortening of cross-linking time, lowering of cross-linking temperature, and improvement in the properties of the crosslinked product. The crosslinking accelerator is generally present from 0.1 to 30, preferably from 0.5 to 20, more

preferably from 1 to 10 PHR.

Brief Summary Text (45):

Suitable examples of crosslinking accelerators include, but are not limited to mecaptobenzothiazole, tetramethylthiuram disulfide, zinc dimethyl dithiocarbamate, for use with a sulfur curing agent; and 1,3-butanediol dimethacrylate, ethylene glycol dimethacrylate, 1,4-butanediol dimethacrylate, 1,6-hexanediol dimethacrylate, polyethylene glycol dimethacrylate, 1,4-butanediol diacrylate, 1,6-hexanediol diacrylate, 2,2'-bis(4-methacryloyldiethoxyphenyl)propane, trimethylolpropane trimethacrylate, trimethylolpropane triacrylate, pentaerythritol trimethacrylate, divinylbenzene N,N'-methylene (bis)acrylamide, p-quinone dioxime, p,p'-dibenzoylquinone dioxime, triazinedithiol, triallyl cyanurate, triallyl isocyanurate (TAIC), bismaleimide for use with organic peroxide curing agents.

Detailed Description Paragraph Table (4):

Preparation of Fluoroelastomer Composition PHR An elastomer mixture containing: FLS 2650 100 (fluoroelastomer from 3M Co. - St. Paul, Minnesota) Cri-D 82.5 5 (activator from Cri-Tech, Inc. - Hanover, Mass) TAIC 2 (cross-link accelerator from Mitsubishi Int'l Corp, New York, NY) N 330 carbon Black 30 (Cabot - Norcross, Georgia) DC 60 2 (60% Dicumyl peroxide from Akrochem - Akron, Ohio)

CLAIMS:

11. The elastomer composition of claim 1, further comprising a crosslinking accelerator.